



# **“Real-time” heat stress among surgeons while performing surgery**

Jill Byrne

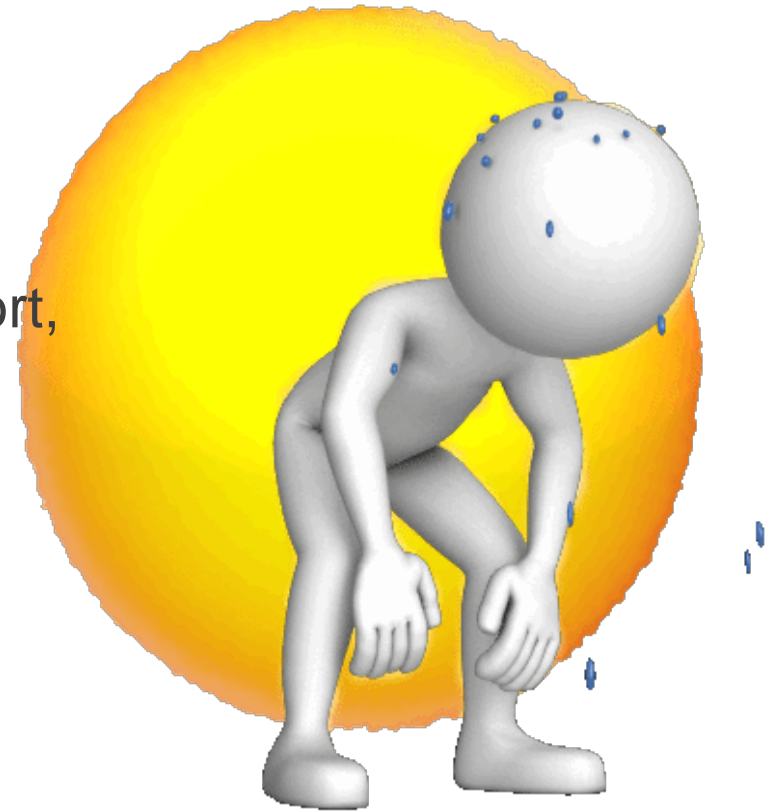
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# Background

## Heat stress impacts surgeons

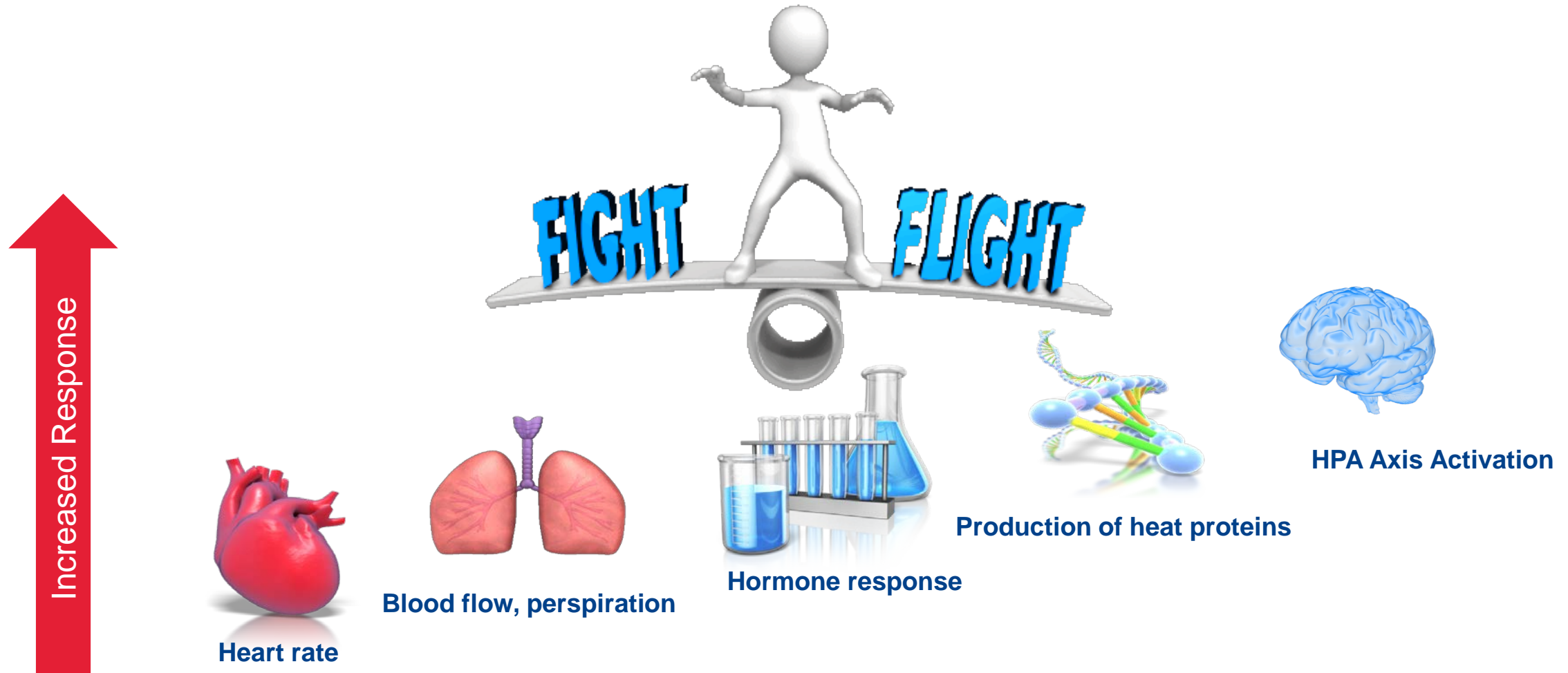
- **Personal protective equipment;** ambient temperature, heat generating equipment
- **Elevated core body temperature** impacts comfort, physiological, and psychological responses
- **Chronic long-term exposure** negatively impacts well-being
- **Cognitive Performance;** executive decisions, processing speed, short-term memory



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# Physiological Response to Heat Stress



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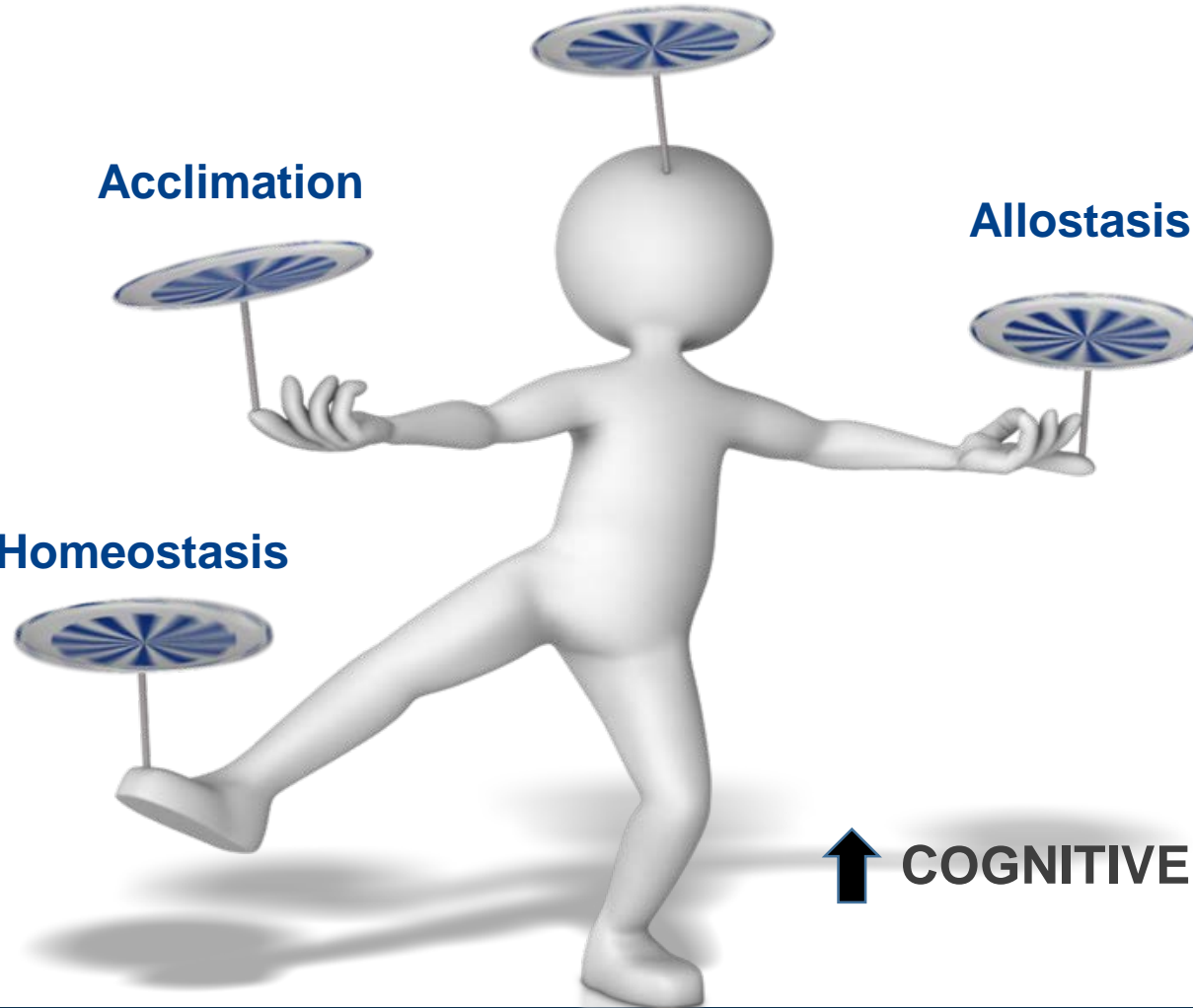
# Adaptation Response

Proteostasis

Acclimation

Allostasis

Homeostasis



COGNITIVE PERFORMANCE

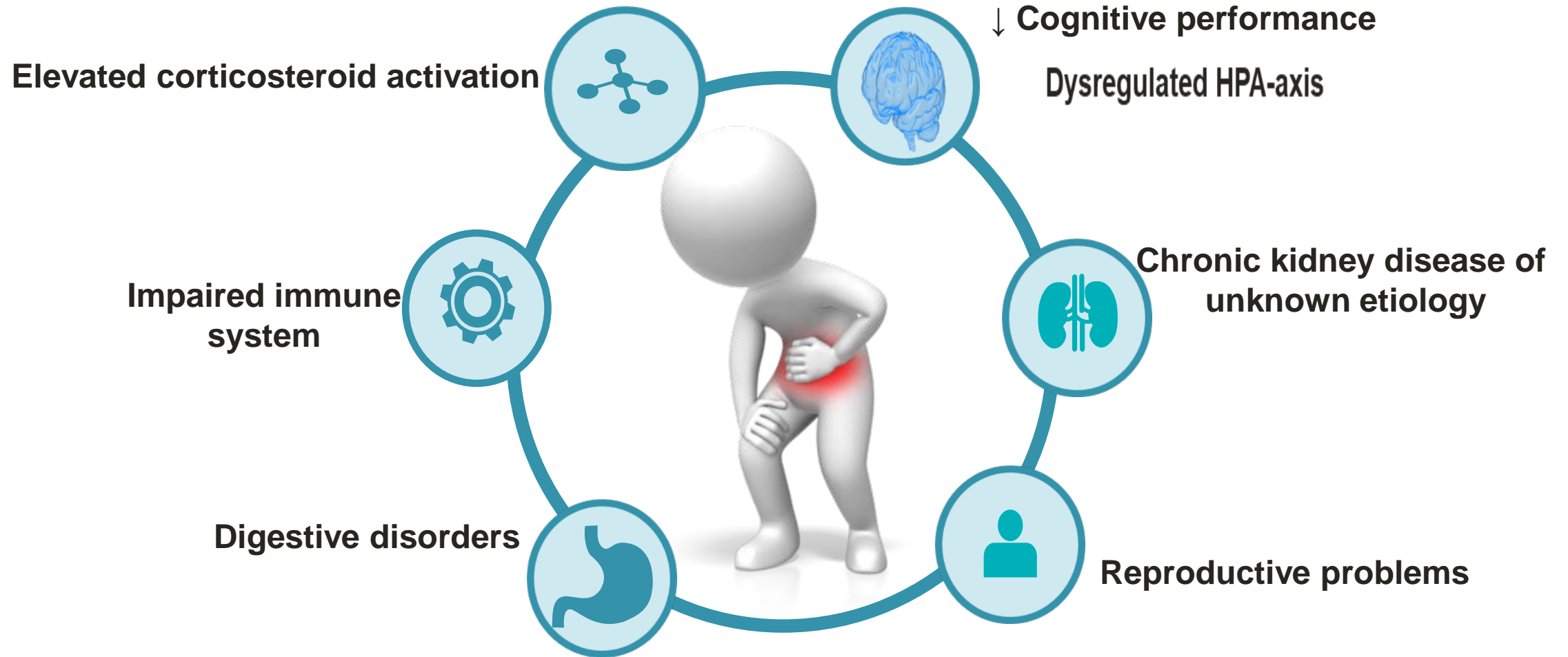


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# Physiological Response to Heat Stress

Chronic activation: **wear and tear**



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# Psychological Response to Heat Stress

## Cognition Performance

<p><b>Aim:</b></p> <p><b>Effects of passive heat on attention and memory</b></p> <p><b>Results:</b></p> <p>↓ working memory ↓ pattern recognition ↑ impulsivity</p> <p><b>Gaoua et al., 2010</b></p>	<p><b>Aim:</b></p> <p><b>Effects of hyperthermia on executive control</b></p> <p><b>Results:</b></p> <p><b>Decreased attention and reaction time</b></p> <p><b>Sun et al., 2012</b></p>	<p><b>Aim:</b></p> <p><b>Effects of hyperthermia on complex tasks</b></p> <p><b>Results:</b></p> <p><b>Decrease in visual-motor tracking</b></p> <p><b>Pill et al., 2017</b></p>
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# Impact on Patient Safety

- HOSPITAL ACQUIRED INFECTIONS DO TO WOUND CONTAMINATION
- DATA ON HOSPITAL ACQUIRED INFECTIONS
- INCREASED LENGTH OF STAY
- INCREASED LIKELIHOOD OF 30 DAY READMISSION



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# Heat Stress Study of Surgeons Performing Surgery in 'Real-time'



**Multiple Cross-Over Design:** 15 male Orthopedic surgeons performing 4 trial each, AB/BA design

**Subjective Comfort scale** by Likert Scale measure

**Skin Temperature** and **Core Body Temperature** measured continuously by wireless sensors

**Cognitive Battery** measuring visual motor tracking, episodic learning, processing speed, delayed memory

**Ambient room temperature** controlled at 21° C



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# Questions?



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